

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Jeff Korn	Art Unit	: 3737
Serial No.	: 10/615,279	Examiner	: Baisakhi Roy
Filed	: July 8, 2003	Conf. No.	: 8225
Title	: OPTICAL COUPLER FOR ROTATING CATHETER		

Mail Stop Appeal Brief - Patents

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

BRIEF ON APPEAL

(1) Real Party in Interest

The real party in interest is InfraReDx, Inc., a corporation of Massachusetts having a place of business at 34 Third Avenue, Burlington, MA as evidenced by an assignment executed November 12, 2003 and recorded at the U.S. Patent Office on November 17, 2003 at Reel 014697, Frame 0978.

(2) Related Appeals and Interferences

There are no related appeals or interference.

(3) Status of Claims

Claims 1-16 are pending and on appeal. Of these, claims 1 and 10 are independent.

(4) Status of Amendment

All amendments have been entered.

(5) Summary of Claimed Subject Matter

Claim 1

Claim 1's limitation of a housing with a rotatable distal face and a stationary proximal face is introduced at paragraph 37 of the pre-grant publication. These structures are also seen FIG. 3, which shows a housing **42** with proximal face **44** and distal face **46**.

The eccentric port **52** and central port **54** are disclosed at paragraph 38 of the pre-grant publication. These structures are also seen in FIG. 3.

An embodiment of claim 1's "lens disposed inside the housing" is the R/S lens **92** shown in FIG. 3 and described in paragraph 43. As shown in FIG. 3, the R/S lens **92** intercepts a rotating collection beam **68** that passes through the eccentric port **54**. This is described in paragraph 43 of the pre-grant publication. The redirection of the beam by the R/S lens **92** to "a focus proximal to the lens as the collection beam rotates" can clearly be seen in FIG. 5, with the rotation being apparent from the difference between FIGS. 3 and 5.

An embodiment of a "beam re-director" is shown in FIGS. 7 and 8 and described as "centrally mounted beam redirector **51**" in paragraph 42 of the pre-grant publication. The delivery beam **58** is shown originating at a light source **32** and redirected by the re-director **51** towards the central port **52**. This too is described in paragraph 42.

Claims 2 and 11

FIG. 7 and paragraph 42 show the additional limitation of a light source **32** in claim 2 and 11.

Claims 3 and 12

The penta-prism recited in claims 3 and 12 is described in paragraph 44 of the pre-grant publication.

Claims 6 and 15

One embodiment of the "detector disposed at the focus" in claims 6 and 15 is described as the detector **66** in paragraph 45 of the pre-grant publication and shown in FIG. 8.

Claim 7

Claim 7's additional limitation of a lens "configured to focus the collection beam off an axis of rotation of the distal face" is shown in FIG. 5, in which the lens **92** focuses the collection beam onto detector **66**, which is clearly off-axis.

Claims 9 and 16

The “axicon lens” recited in claims 9 and 16 is disclosed at paragraph 49 of the pre-grant publication.

Claim 10

Claim 10's limitation of a “rotating catheter” is met by the disclosure, at paragraph 31 of the pre-grant publication, of a catheter **16** that includes a jacket **17** surrounding a rotatable core **19**. The same paragraph discloses a delivery fiber **18** and a collection fiber **20** that extends through the core of the catheter.

Claim 10's limitation of a housing with a rotatable distal face and a stationary proximal face is introduced at paragraph 37 of the pre-grant publication. These structures are also seen in FIG. 3, which shows a housing **42** with a proximal face **44** and a distal face **46**.

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An embodiment of claim 10's “lens disposed inside the housing” is the R/S lens **92** in FIG. 3 and described in paragraph 43. As shown in FIG. 3, the R/S lens **92** intercepts a rotating collection beam **68** that passes through the eccentric port **54**. This is described in paragraph 43 of the pre-grant publication. The redirection of the beam by the R/S lens **92** to “a focus proximal to the lens as the collection beam rotates” can clearly be seen in FIG. 5, with the rotation being apparent from the difference between FIGS. 3 and 5.

An embodiment of a “beam re-director” is shown in FIGS. 7 and 8 and described as “centrally mounted beam redirector **51**” in paragraph 42 of the pre-grant publication. The delivery beam **58** is shown originating at a light source **32** and redirected by the re-director **51** towards the central port **52**. This too is described in paragraph 42.

(6) Grounds of Rejection to be Reviewed on Appeal

1. The Examiner rejects claims 1-16 as being anticipated under 35 USC 102(e) by *Boppart et al.*, U.S. Patent No. 6,485,413.

2. Under the doctrine of obviousness-type double-patenting, the Examiner rejects claims 1-16 as having claims that are obvious variants of those in *Zuluaga et al.*, U.S. Patent No. 6,895,137.
3. Under the doctrine of obviousness-type double-patenting, the Examiner rejects claims 1-16 as having claims that are obvious variants of those in *Zuluaga et al.*, U.S. Patent No. 6,654,630.

(7) **Argument**

***Boppart* fails to teach housing with a “rotatable distal face and a stationary proximal face**

In the final office action, the Examiner states that housing **280** in *Boppart* FIG. 18 corresponds to claim 1's housing.¹

Anyone who was seen a see-saw in operation would recognize that *both* ends of the see-saw move. Housing **280**, with its pivot point, is just like a see-saw. As it swings back-and-forth, *both* ends, including the faces, of the housing are in motion. Therefore, the housing **280** *has* no stationary face as required by claim 1.

Housing **280** holds a GRIN lens **62** at its distal face. Opposite the GRIN lens **62** is the proximal face of the housing. The pivot point lies between the proximal and distal faces.

Because of the pivot point, when one pushes the proximal face of the housing to the left, the distal face swings to the right, and vice versa. The arrangement shown in FIG. 18 is thus like a see-saw, except that it swings left-to-right rather than up-and-down.

Presumably, the Examiner regards this left-to-right motion as a rotation about an axis defined by the pivot point. For this reason, the Examiner regards the distal face as a “rotatable distal face” as required by claim 1.

As a result, of this swinging motion, the GRIN lens **62** scans left-to-right in the forward direction. In FIG. 18 this would be in and out of the page. The draftsman evidently attempted to

¹ *Final Action*, page 2.

communicate this scanning motion by drawing a double-headed arrow and scan lines in a perspective that suggests scanning along a plane perpendicular to the page.

All that is missing from the above description is a way to actually apply this back-and-forth force on the proximal face. This is what the pin **270**, the elliptical groove **274**, and the rotating cable **206** are for.

The proximal face of the housing **280** has a groove **274**. The pin **270** engages this groove. As the cable **206** rotates pin **270**, pin **270** exerts a radial force against the groove **274**. This radial force swings the proximal face in one direction. As the proximal face swings in one direction, the distal face, which is on the other side of the pivot point, swings in the opposite direction.

It is quite clear therefore that both the distal face and the proximal face of the housing **280** will swing from side-to-side as the housing pivots around the pivot point. Consequently, no face on the housing **280** is stationary. Both faces swing from side-to-side as the cable rotates.

In the advisory action, the Examiner states that

“with the rotation of the cable at the proximal end of the endoscope, catheter, or guidewire, the rotation is translated to the distal end to drive the GRIN lens housing **280** (col. 29 lines 36-39). Therefore the distal end of the housing rotates while the other end remains stationary.’

Applicant agrees that “the rotation [of the pin] is translated to the distal end” of the housing **280**. But this does *not* mean that the proximal end is stationary.

An objective reading of the description of FIG. 18 at col. 29 lines 17-64 reveals exactly how this rotation is “translated to the distal end.” It is translated by allowing the pin **270** to traverse a groove **274** in the proximal face, thus “translating” the rotational motion of the pin **270** into a side-to-side motion of the proximal face. The pivot point then translates this side-to-side motion of the proximal face into an opposite side-to-side motion on the distal face, just like a seesaw.

It is clear therefore that *both* faces of the housing **280** must move. Therefore, housing **280** lacks a *stationary face* as required by claims 1.

The Examiner apparently regards the distal face of housing **280** as rotating about the pivot point. However, the proximal face of the housing *also* moves about the pivot point. It does so 180 degrees out-of-phase with the distal face. Thus, to the extent one regards the distal face as rotating about the pivot point, one must also regard the proximal face as rotating about the same pivot point. Consequently, the proximal face cannot be regarded as stationary.

Boppart fails to teach an eccentric port

In the advisory action, the Examiner states that “[w]ith respect to the ports, the various ports are shown in FIG. 21.”

Applicant draws attention to two flaws in the Examiner's position:

- (1) The optical coupler shown in FIG. 21 is completely different from the device shown in FIG. 18.
- (2) The optical coupler shown in FIG. 21 does not have an eccentric port.

With regard to the first flaw, FIG. 18 shows a catheter tip assembly whose function is to scan in the forward direction. It does so by placing a GRIN lens, pointed forward, into housing **280** and then pivoting housing **280** from side-to-side. This side-to-side motion forms the basis for scanning.

In contrast, FIG. 21 shows a grinding catheter whose function is to grind through obstacles in a lumen. It does so by rotating a pair of grinding blades. These blades are shiny enough so that they also function as a mirror to reflect light radially toward the wall of the lumen.

Although the devices shown in FIGS. 21 and 18 both carry a beam of light through a blood vessel, the two devices are completely different in structure and function. To the extent the scanning catheter in FIG. 18 has a housing having a stationary face and a rotatable face, even the

Examiner recognizes it does not have an eccentric port. To the extent the grinding catheter of FIG. 21 has an eccentric port, even the Examiner recognizes that it does not have a housing having both a rotatable face and a stationary face.

In arriving at the section 102 rejection, the Examiner exploits the fact that both the grinding catheter and the scanning catheter are described in the same patent. Having found a claim element in the grinding catheter and another claim element in the scanning catheter, the Examiner assumes section 102 has been satisfied.

However, section 102 requires that the anticipating reference disclose the claimed *invention*, not the parts that make up the claimed invention. Were the law otherwise, one could simply cite an encyclopedia as an anticipating reference in virtually every case.

A section 102 rejection requires not only that every element of the claim be disclosed in a reference but that “[t]hese elements must be arranged as in the claim under review.”² In the present case, *Boppart* describes numerous catheters. But none of those catheters include all the limitations of the claimed invention arranged in the manner set forth in the claim.

In rejecting the claim as anticipated, the Examiner relies on FIG. 21’s grinding catheter to supply the housing’s eccentric port and a completely different device, FIG. 18’s scanning catheter, to supply the housing’s stationary and rotating faces. However, neither the grinding catheter nor the scanning catheter shows all the elements “arranged as in the claim under review” as required by *In re Bond*. Accordingly, the cited art fails to teach all elements of the claim “arranged as in the claim under review.”

With regard to the second flaw, FIG. 21 does not, in fact, show any eccentric port as claimed.

In the final office action, the Examiner suggests that the imaging port 324 in FIG. 21a, described in col. 32, lines 32-54, corresponds to claim 1’s “eccentric port.”

² *In re Bond*, 910 F.2d 831, 15 USPQ 2d 1566 (Fed. Cir. 1990).

Imaging port **324** is a port on the side wall of the rotating shaft **316**. But claim 1 requires that eccentric port be on the *distal face* of the housing. The side wall of the rotating shaft **316** is *not* a distal face of anything, it is a side wall. Claim 1 does *not* recite a side wall with an eccentric port. It recites a *distal face* with an eccentric port.

Section 102 requires the allegedly anticipating reference to teach each and every limitation of a claim arranged in the manner set forth by the claim.

The imaging port **324** is clearly *not* an eccentric port in a *distal face*. It is a port in a side wall. A side wall is not a distal face of the housing. Therefore, the section 102 rejection is improper.

In the final office action, the Examiner suggests another passage, col. 14, lines 44-50, that allegedly describes an eccentric port in the distal face of a housing.

The passage at col. 14, lines 44-50 describes a way to scan in the forward direction, as shown in FIG. 8B. There is nothing in this passage or in FIG. 8B that could reasonably be an eccentric port in the distal face of the housing as recited in the claim.

It is apparent, therefore, that the cited art fails to show a housing that has *both* a central port *and* eccentric port on a distal face thereof, as expressly required by claim 1. Because the Examiner has failed to identify any disclosure in *Boppart* of a housing having a distal face with *both* an eccentric port *and* a central port, the section 102 rejection is improper and should be reversed.

Boppart fails to show a lens that intercepts a rotating collection beam emerging from an eccentric port

The Examiner proposes that any one of the offset GRIN lenses **62** in FIGS. 6a-f and FIGS. 7a-f could serve as claim 1's "lens disposed inside the housing to intercept a rotating collection beam emerging from the eccentric port."

In rejecting the claim on this basis, the Examiner compounds the error already made in connection with identifying an eccentric port, namely that of piecing together the claimed

invention by scavenging from parts taken from independent and distinct catheters disclosed in a single reference.

With the addition of the lens **62**, the Examiner has now identified three claim elements from three separate and distinct embodiments disclosed by *Boppart*. The Examiner has already taken an allegedly eccentric port from the grinding catheter of FIG. 21 and combined it with the housing from the scanning catheter of FIG. 18. He now proposes to include, within this slowly expanding chimera, yet another component, GRIN lens **62**, from yet another separate and distinct catheter.

As discussed above, it is improper to essentially dismantle all embodiments described in a reference and reassemble the claimed invention using the various parts and guided by the claim as a template. To do so is inconsistent with *In re Bond*, which requires that a single reference disclose all claim elements *arranged as recited in the claim*.

Applicant further notes that the housing **280** of FIG. 18 already houses a GRIN lens that swings from side-to-side. It makes no sense to add to the FIG. 18 embodiment yet another GRIN lens, this one being configured to be stationary instead of swinging side-to-side.

Furthermore, none of the GRIN lenses **62** of FIGS. 6a-f and FIGS. 7a-f “intercept a rotating collection beam emerging from the eccentric port.” This is because: (1) there is no eccentric port; and (2) there is no rotating beam to intercept. It is clear by inspection of FIGS. 6a-f and 7a-f that all GRIN lenses are centrally mounted and that any one of these GRIN lens **62** would intercept a non-rotating beam passing through the *center* of the distal face.

It is unclear whether the Examiner has also drawn attention to the offset GRIN lens **62**” in FIG. 8a. However, that GRIN lens, like the others, clearly receives a *non-rotating* beam from a single large *central* port, namely the transparent window. It does not receive a rotating beam from any eccentric port, as recited in claim 1.

In his hunt for a suitable structure to serve as a lens, the Examiner further suggests that perhaps it is the GRIN lens **62** in FIG. 18, and not the GRIN lenses in FIGS. 6a-f or FIGS. 7a-f that could serve as claim 1's lens.³

GRIN lens **62** does not "intercept a rotating collection beam." In fact, GRIN lens **62** swings from side to side. Nor is there any rotating collection beam for it to intercept.

The Examiner may be confused because the cable **206** in FIG. 18 rotates. But this rotation is ultimately translated into a side-to-side motion as described above. It does not result in rotation of the GRIN lens. Nor does it result in interception, by that GRIN lens, of any rotating collection beam.

Moreover, GRIN lens **62** does not intercept anything emerging from an eccentric port, as the claim requires. As suggested by FIG. 18, GRIN lens **62** receives and transmits light through the central (and only) port of the housing **280**.

Boppart fails to show a beam re-director

Claim 1 further requires a beam re-director "disposed between the lens and the distal face." This beam re-director must also be "oriented to direct a delivery beam toward the central port."

In the final action, the Examiner states that such a beam re-director is disclosed at col. 14, lines 51-42, a passage that refers to FIG. 8b's prisms **136** or **144**.⁴

If prisms **136**, **144** are regarded as claim 1's "beam re-director," then claim 1's "distal face" would presumably correspond to transparent window **54** in FIG. 8b, and claim 1's "lens" presumably corresponds to lens **152**. It is quite plain from inspection of FIG. 8b that prisms **136** and **144** are proximal to *both* lens **152** and window **54**. They are not "disposed *between*" lens **152** and window **54**. Therefore, neither of *Boppart's* prisms **136**, **144** are "disposed *between* the lens and the distal face" of the housing, as required by claim 1.

³ *Final Action*, page 2.

⁴ *Final Action*, page 5.

The Examiner further draws attention to FIG. 21b(iii) the accompanying description at col. 33.

The cited text refers to a beam director **328** that is not expressly shown in FIG. 21. Applicant assumes that this beam redirector is represented by the unlabelled rectangle that appears to be focusing a beam onto the imaging plane.

It is plain from inspection of FIG. 21b(ii) that the beam re-director is *not* between any lens and the distal face. In fact, it appears that the beam re-director is already *at* the distal face of the rotating shaft.

SECTION 102 REJECTION OF CLAIM 10

Claim 10 includes all the limitations of claim 1. Accordingly, Applicant re-asserts all the arguments set forth above in connection with claim 1.

In addition, claim 10 recites the additional limitation that *both* “a collection fiber *and* a delivery fiber” extend through a rotating catheter.

The Examiner draws attention to FIGS. 8a-8d as teaching a rotating catheter” through which extends *both* “a collection fiber *and* a delivery fiber.”

However, each of FIGS. 8a-8d shows a structure that has only *one* fiber extending through a catheter. These structures are all inconsistent with claim 10, which requires *two* fibers, not one. Therefore, none of FIGS. 8a-8d can possibly teach the claim limitation of “a rotating catheter having a collection fiber *and* a delivery fiber extending therethrough.”

SECTION 102 REJECTION OF CLAIMS 2 AND 11

Claim 2 recites “a light source disposed to direct a delivery beam radially inward to the beam redirector.” The Office suggests that *Boppart* FIG.22 shows such a light source.

As best understood, the microchip **344** in FIG. 22 is believed to meet the limitation of claim 2's light source. However, the microchip **344** does not direct any beam “radially inward” as required by claim 2.

Boppart's claim 8 recites a light source. But there is no suggestion in claim 8 that the light source directs a beam "radially inward."

Claim 11 includes limitations similar to claim 2 and is patentable for at least the same reasons.

SECTION 102 REJECTION OF CLAIMS 3 AND 12

Claims 3 and 12 both require that the beam re-director comprise "a penta-prism."

The Examiner draws attention to *Boppart's* teaching of prisms at col. 14, lines 51-52. However the cited text refers to a "circular prism" and "a second prism." The Examiner has not shown that either prism is a "penta-prism."

Accordingly, the section 102 rejection of claims 3 and 12 is improper.

SECTION 102 REJECTION OF CLAIMS 6 AND 15

Claims 6 and 15 both recite the additional limitation of "a detector disposed at the focus for receiving the rotating collection beam."

The Examiner cites two passages as allegedly teaching this limitation.

The first passage, col. 14, lines 21-43, describes FIGS. 8a-8d. This passage does not mention detectors at all.

The second passage, col. 32, lines 33-54, describes the tissue grinding catheter of FIG. 21a(ii). Like the first passage, this second passage does not mention any detector.

Accordingly, the Examiner has not identified the additional limitation of claims 6 and 15 in *Boppart*. The section 102 rejection is thus flawed and should be reversed.

SECTION 102 REJECTION OF CLAIMS 6 AND 7

The Examiner has said nothing at all about where the additional limitations of claim 6 and 7 are taught. Nor is it readily apparent where these limitations are taught. Accordingly, the section 102 rejection of claims 6 and 7 is incomplete.

SECTION 102 REJECTION OF CLAIMS 9 AND 16

Claims 9 and 16 recite the limitation of a lens that comprises an "axicon lens."

In rejecting the claim, the Examiner asserts that axicon lenses are known in the art and therefore the lens **62** of *Boppart* could just as well have been an axicon lens.

Applicant submits that this reasoning is improper. A section 102 rejection require that the reference teach every limitation in the claim. The fact that a reference teaches the use of one particular type of lens does not mean that it also teaches the use of every possible lens.

Boppart does not teach an axicon lens. Applicant agrees that it *could have* taught an axicon lens. But the fact remains that it did not. Section 102 states that "[a] person shall be entitled to a patent unless the invention *was described* in a printed publication," not that the invention "*could have been* described in a printed publication." Therefore, the section 102 rejection of claims 9 and 16 is improper.

DOUBLE PATENTING REJECTION

An obviousness-type double-patenting rejection of a claim is appropriate when that claim is an obvious variant of a claim in an issued patent or pending application. Thus, in an obviousness-type double patenting rejection, the two claims must purport to cover obvious variants of the same subject matter.

The Examiner's remarks suggest a misunderstanding in the concept of double-patenting. A double-patenting rejection is only proper when two claims recite the same, or essentially the same, subject matter. The fact that one claim dominates another is, by itself, insufficient to support a double-patenting rejection. In recognition of the confusion between domination and double-patenting, the MPEP advises Examiners that

"[D]omination and double patenting should not be confused. They are two separate issues. One patent or application "dominates" a second patent or application when the first patent or application has a broad or generic claim which fully encompasses or reads on an invention defined in a narrower or more specific claim in another patent or application. Domination by itself, i.e. in the absence of

statutory or non-statutory double patenting grounds, cannot support a double patenting rejection.”⁵

The Examiner states that claims in U.S. Patent No. 6,895,137 “anticipate the claims in the current application.” The Examiner then states that “[t]he patented claims include additional structural limitations” and that these patented claims are “more specific than the current application claims.”

However, as discussed in the above section from the MPEP, a double-patenting rejection requires more than that one claim “anticipate” or “dominate” another. A double-patenting rejection requires that two claims recite obvious variants of the same subject matter.

The present double-patenting rejection involves two issued patents and one application. Despite the huge number of combinations possible, the Examiner has not identified the claims that are believed to recite obvious variants of the same invention, and some basis for suggesting that one of ordinary skill in the art would have found these variants to be obvious ones.

US 6,895,137

All the claims of the '137 patent lack the limitation of a housing having a stationary proximal face and an eccentric port in a distal face thereof. These claims are therefore all different from at least claim 1 of the '137 patent. The Examiner does not provide reasoning for why one of ordinary skill in the art would have found this difference obvious. Accordingly, the double-patenting rejection based on the '137 patent is improper.

US 6,654,360

All the claims of the '360 patent lack the limitation of a housing having a stationary proximal face and an eccentric port in a distal face thereof. These claims are therefore all different from claim 1 of the '360 patent. The Examiner does not provide reasoning for why one of ordinary skill in the art would have found the difference obvious. Accordingly, the double-patenting rejection based on the '360 patent is improper.

⁵ MPEP 804(II).

Double Patenting Rejection Based on 10/309477

The claims stand provisionally rejected on the ground of obviousness-type double patenting over the claims in co-pending parent application Serial No. 10/309,477.

Per MPEP § 804.I.B.1., "[i]f the ODP rejection is the only rejection remaining in the later-filed application, while the earlier application is rejectable on other grounds, a terminal disclaimer must be filed in the later-filed application before the rejection can be withdrawn."


The 10/309,477 application is still actively in prosecution, making the scope of the claims indeterminate at the present time. Accordingly, Applicant proposes that this rejection be held in abeyance until the conditions set forth in MPEP 804.I.B.I are met.

(8) Conclusion

Please apply the brief fee of \$255 along with any other charges or credits to Deposit Account No. 06-1050, referencing Attorney Docket No. 12258-036001.

Respectfully submitted,

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Faustino A. Lichauco
Reg. No. 41,942

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

Appendix of Claims

1. An optical coupler comprising:

a housing with a rotatable distal face and a stationary proximal face, the distal face
having an eccentric port and a central port;

a lens disposed inside the housing to intercept a rotating collection beam emerging from
the eccentric port and to re-direct the collection beam to a focus proximal to the lens
as the collection beam rotates; and

a beam re-director disposed between the lens and the distal face, the beam re-director
being oriented to direct a delivery beam toward the central port.
2. The optical coupler of claim 1, further comprising a light source disposed to direct a
delivery beam radially inward to the beam re-director.
3. The optical coupler of claim 1, wherein the beam re-director comprises a penta-prism.
4. The optical coupler of claim 1, wherein the beam re-director comprises a prism.
5. The optical coupler of claim 1, wherein the beam re-director comprises a mirror.
6. The optical coupler of claim 1, further comprising a detector disposed at the focus for
receiving the rotating collection beam.
7. The optical coupler of claim 1, wherein the lens is configured to focus the collection
beam on an axis of rotation of the distal face.

8. The optical coupler of claim 1, wherein the lens is configured to focus the collection beam off an axis of rotation of the distal face.
9. The optical coupler of claim 1, wherein the lens comprises an axicon lens.
10. A system for identifying vulnerable plaque, the system comprising:
 - a rotating catheter having a collection fiber and a delivery fiber extending therethrough;
 - a housing with a rotatable distal face and a stationary proximal face, the distal face having an eccentric port and a central port;
 - a lens disposed inside the housing to intercept a rotating collection beam emerging from the eccentric port and to re-direct the collection beam to a focus proximal to the lens as the collection beam rotates; and
 - a beam re-director disposed between the lens and the distal face, the beam re-director being oriented to direct a delivery beam toward the central port.
11. The system of claim 10, further comprising a light source disposed to direct a delivery beam radially inward to the beam re-director.
12. The system of claim 10, wherein the beam re-director comprises a penta-prism.
13. The system of claim 10, wherein the beam re-director comprises a prism.
14. The system of claim 10, wherein the beam re-director comprises a mirror.

15. The system of claim 10, further comprising a detector disposed at the focus for receiving the rotating collection beam.
16. The system of claim 10, wherein the lens comprises an axicon lens.

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Evidence Appendix

None.

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Related Proceedings Appendix

None.